

WHAT IS CLAIMED IS:

1. A communication system for establishing a connection via a plurality of relay apparatuses between an end system of a communicating source and an end  
5 system of a communicating destination and communicating data, wherein

each of said relay apparatuses comprises:

a connection negative response unit which, when an error of a next relay destination is detected at the  
10 time of reception of a connection establishment request, refuses the connection establishment request and transmits a negative response to a relay source; and

a negative response relay unit which, when said  
15 negative response is received from the relay destination, transmits the received negative response to the relay source, and

said end system of the communicating source has a connection establishment requesting unit which, when  
20 said negative response is received from the relay destination after said connection establishment request is transmitted, issues again the connection establishment request in which another relay destination has been selected without notifying an  
25 application of a failure of the connection establishment and establishes a connection to the communicating destination end system by another path.

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2. A system according to claim 1, wherein said end system of the communicating source has a plurality of relay apparatuses as a plurality of relay destinations, and in the case where the negative response is received after a specific relay apparatus is selected and the connection establishment request is transmitted, said communicating source end system selects another relay apparatus and retransmits the connection establishment request.

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3. A system according to claim 1, wherein said end system of the communicating source has a plurality of relay adapters provided for one relay apparatus as a plurality of relay destinations, and in the case where the negative response is received after a specific relay adapter is selected and the connection establishment request is transmitted, said communicating source end system selects another relay adapter and retransmits the connection establishment request.

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4. A system according to claim 1, wherein said relay apparatus has a relay selecting unit which, when said negative response is received from the relay destination after said connection establishment request is relayed, issues again the connection establishment request in which another relay destination has been

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selected and establishes a connection to said communicating destination end system by another path.

5. A system according to claim 4, wherein said relay apparatus has a plurality of relay apparatuses as a plurality of relay destinations, and in the case where the negative response is received after a specific relay apparatus is selected and the connection establishment request is transmitted, said relay apparatus selects another relay apparatus and retransmits the connection establishment request.
6. A system according to claim 4, wherein said relay apparatus has a plurality of relay adapters provided for one relay apparatus as a plurality of relay destinations, and in the case where the negative response is received after a specific relay adapter is selected and the connection establishment request is transmitted, said relay apparatus selects another relay adapter and retransmits the connection establishment request.
7. A system according to claim 1, wherein each of said end system and said relay apparatuses switches a communication path by 4-layer switches for establishing a TCP connection.

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8. A system according to claim 1, wherein:

said negative response relay unit of said relay apparatus stores refusal reasons and location information of a fault occurrence relay apparatus into an optional area or a user data area of a negative response packet and transmits them to the relay source; and

when said negative response packet is received, said connection establishment requesting unit of said communicating source end system changes a status of the relay destination in which a fault path occurred to an unusable state and, thereafter, selects another relay destination and retransmits the connection establishment request.

9. A system according to claim 8, wherein the location information of the abnormal relay apparatus which is stored in said negative response packet is an IP address of an abnormal relay apparatus and the number of hopping times indicative of the number of normal relay apparatuses to the abnormal relay apparatus.

10. A system according to claim 8, wherein said negative response relay unit of said relay apparatus further stores a self IP address into the optional area or user data area of said negative response packet and

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transmits it to the relay source.

11. A relay apparatus for establishing a connection  
between an end system of a communicating source and an  
5 end system of a communicating destination and  
communicating data, comprising:

a connection negative response unit which, when an  
error of a relay destination is detected at the time of  
reception of a connection establishment request,  
10 refuses the connection establishment request and  
transmits a negative response to a relay source; and

a negative response relay unit which, when said  
negative response is received from the relay  
destination, transmits the received negative response  
15 to the relay source.

12. An apparatus according to claim 11, wherein said  
negative response relay unit stores refusal reasons, an  
IP address of an abnormal relay apparatus indicative of  
20 a location of a fault occurrence relay apparatus, and  
the number of hopping times indicative of the number of  
normal relay apparatuses to the abnormal relay  
apparatus into an optional area or a user data area of  
a negative response packet and transmits them to the  
25 relay source.

13. An end system for establishing a connection via a

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plurality of relay apparatuses and communicating data, comprising:

an application which issues a communicating request by setting a specific end system to a partner destination; and

a connection establishment requesting unit which, when a negative response is received from a relay destination after a connection establishment request based on said communicating request is transmitted, issues again a connection establishment request in which another relay destination has been selected without notifying said application of a failure of the connection establishment and establishes a connection to a communicating destination end system by another path.

14. A system according to claim 13, wherein when a negative response packet is received, said connection establishment requesting unit changes a status of the relay destination in which a fault path occurred to an unusable state and, thereafter, selects another relay destination and retransmits the connection establishment request.

15. A communicating method of establishing a connection via a plurality of relay apparatuses between an end system of a communicating source and an end

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system of a communicating destination and communicating data, comprising the steps of:

when an error of a next relay destination is detected in one of said relay apparatuses at the time  
5 of reception of a connection establishment request, refusing the connection establishment request and transmitting a negative response to a relay source; and

when the relay apparatus receives said negative response from a relay destination, transmitting the  
10 received negative response to the relay source from said relay apparatus,

wherein when said negative response is received from the relay destination after said connection establishment request is transmitted, said end system  
15 of the communicating source issues again the connection establishment request in which another relay destination has been selected without notifying an application of a failure of the connection establishment and establishes a connection to the  
20 communicating destination end system by another path.

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